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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,471	04/27/2006	Yuji Iwaki	0756-7673	4788

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EXAMINER	
WILSON, MICHAEL H	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,471	IWAKI ET AL.	
	Examiner	Art Unit	
	MICHAEL WILSON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20060801; 20060925*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 4, 6-9, 13, 15, 16, 18-21, 25, 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato et al. (US 2003/0218418 A9).

Regarding claims 1, 8, 9, 13, 20 and 21, Sato et al. disclose a composite material comprising an organic compound of instant formula (1) and an inorganic compound ([0047]; host material [0074], inorganic material [0150] and [0154]). The reference also discloses a light emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a layer with an inorganic compound ([0150 and [0154]) and a compound of instant general formula (1) ([0047] and [0074]). The light emitting layer of Sato et al. contains a carbazole compound, an inorganic compound, and a light emitting compound meeting the above claim limitations.

Regarding claims 3 and 15, Sato et al. disclose a composite material comprising an organic compound of instant formula (3) ([0047]; [0074] H-1 to H-5, H-10, H-11, H-22, H-23, and H-30), and an inorganic compound ([0047]; examples in [0150] and [0154]). The reference also discloses a light emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a

layer with an inorganic compound ([0150 and [0154]) and a compound of instant general formula (3) ([0047] and [0074]). The light emitting layer of Sato et al. contains a carbazole compound, an inorganic compound, and a light emitting compound meeting the above claim limitations.

Regarding claims 4 and 16, Sato et al. disclose a composite material comprising an organic compound of instant formula (4) ([0047]; [0074] H-25, H-26, H-28, H-29, H-31, and H-32), and an inorganic compound ([0047]; examples in [0150] and [0154]). The reference also discloses a light emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a layer with an inorganic compound ([0150 and [0154]) and a compound of instant general formula (4) ([0047] and [0074]). The light emitting layer of Sato et al. contains a carbazole compound, an inorganic compound, and a light emitting compound meeting the above claim limitations.

Regarding claims 6 and 18, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a composite material wherein Ar is a structure of instant formula 3-1 ([0074] H-1 and H-2), 3-2 ([0074] H-3), 3-3 ([0074] H-10), 3-8 ([0074] H-23), 3-9 ([0074] H-24), and 3-10 ([0074] H-30).

Regarding claims 7 and 19, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a composite material wherein Ar is a structure of instant formula 4-1 ([0074] H-25, H-26, and H-29), 4-2 ([0074] H-28), 4-3 ([0074] H-31 and H-32).

Regarding claims 25 and 26, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission of the light-emitting element given that the voltage needed to obtain a specific luminance is reported (table 3, page 46). Also the reference discloses an electronic appliance with a display portion comprised of a light emitting element [0261].

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.,* 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 2, 5, 14, 17, 10-12, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US 2003/0218418 A9) in view of Shiratsuchi et al. (US 6,084,176).

Regarding claims 10-12 and 22-24, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a hole transporting layer to ensure

high efficiency in hole injection from the anode and efficient transportation of hole to the light-emitting layer [0172]. Compounds such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and spiro compounds such as 2,2',7,7'-tetrakis(diphenylamino)-9,9'-spirobifluorene are disclosed as suitable for the hole transport layer. The reference also discloses metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]). A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. However the reference does not explicitly disclose a carbazole compounds with a metal oxide in the hole transporting layer.

It would be obvious to one of ordinary skill in the art at the time of the invention to add metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide to the hole transporting layer. One of ordinary skill in the art would reasonably expect such a combination to be suitable given material for the hole transporting layer needs a small ionization potential, high hole mobility, and excellent stability [0172], which are properties vanadium oxide, ruthenium oxide, and molybdenum oxide are disclosed to have ([0211]-[0212]). Vanadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer [0172]. One of ordinary skill would be motivated by a desire to lower initial driving voltage,

suppress the voltage elevation on continuous driving, and improve adhesion [0211] without forming additional layers.

Shiratsuchi et al. teach carbazole compounds of instant general formula (2) (compound H-23, column 23) and (3) (compounds H-24 and H-38, columns 23 and 29) as suitable compounds for the hole transport layer (column 13, line 12 to column 14, line 5) used in a photoelectric device (column 2, lines 12-16). The reference also teaches carbazole compounds a equivalent with hole transporting compounds of Sato et al. such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and tertiary amine containing fluorene compounds for use in the hole transport layer (column 13, line 12 to column 14, line 5).

In view of Shiratsuchi et al.'s recognition that carbazole compounds and hole transporting compounds of Sato et al. are equivalent and interchangeable, it would have been obvious to one of ordinary skill in the art to substitute the hole transporting compounds of Sato et al. with carbazole compounds such as H-23, H-24, or H-38 taught by Shiratsuchi et al. and thereby arrive at the present invention. Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See In re Ruff 118 USPQ 343 (CCPA 1958).

Regarding claims 2, 5, 14, and 17, Sato et al. disclose a composite material comprising an organic compound of instant formula (1) and an inorganic compound ([0047]; host material [0074], inorganic material [0150] and [0154]). The reference also

discloses a light emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a hole transporting layer with an organic compound [0172]. Additionally the reference discloses the hole transporting layer ensures high efficiency in hole injection from the anode and efficient transportation of hole to the light-emitting layer [0172]. Compounds such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and spiro compounds such as 2,2',7,7'-tetrakis(diphenylamino)-9,9'-spirobifluorene are disclosed as suitable for the hole transport layer. The reference also discloses metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]). A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. However the reference does not explicitly disclose a carbazole compounds with a metal oxide in the hole transporting layer or a compound of instant formula (2).

It would be obvious to one of ordinary skill in the art at the time of the invention to add metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide to the hole transporting layer. One of ordinary skill in the art would reasonably expect such a combination to be suitable given material for the hole transporting layer needs a small ionization potential, high hole mobility, and excellent stability [0172], which are properties vanadium oxide, ruthenium oxide, and molybdenum oxide are disclosed to have ([0211]-[0212]). Vanadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to

subsequent layers, which is disclosed as the function of the hole transport layer [0172]. One of ordinary skill would be motivated by a desire to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211] without forming additional layers.

Shiratsuchi et al. teach carbazole compounds of instant general formula (2) with Ar of instant formula2-1 (compound H-23, column 23) as suitable compounds for the hole transport layer (column 13, line 12 to column 14, line 5) used in a photoelectric device (column 2, lines 12-16). The reference also teaches carbazole compounds a equivalent with hole transporting compounds of Sato et al. such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and tertiary amine containing fluorene compounds for use in the hole transport layer (column 13, line 12 to column 14, line 5).

In view of Shiratsuchi et al.'s recognition that carbazole compounds and hole transporting compounds of Sato et al. are equivalent and interchangeable, it would have been obvious to one of ordinary skill in the art to substitute the hole transporting compounds of Sato et al. with carbazole compounds such as H-23 taught by Shiratsuchi et al. and thereby arrive at the present invention. Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See In re Ruff 118 USPQ 343 (CCPA 1958).

6. Claims 10-12 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US 2003/0218418 A9) in view of Shirota et al. (US 5,487,953).

Regarding claims 10-12 and 22-24, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a hole transporting layer to ensure high efficiency in hole injection from the anode and efficient transportation of hole to the light-emitting layer [0172]. The reference also discloses metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]). A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. However the reference does not explicitly disclose a carbazole compounds with a metal oxide in the hole transporting layer.

It would be obvious to one of ordinary skill in the art at the time of the invention to add metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide to the hole transporting layer. One of ordinary skill in the art would reasonably expect such a combination to be suitable given material for the hole transporting layer needs a small ionization potential, high hole mobility, and excellent stability [0172], which are properties vanadium oxide, ruthenium oxide, and molybdenum oxide are disclosed to have ([0211]-[0212]). Vanadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer [0172]. One of ordinary skill would be motivated by a desire to lower initial driving voltage,

suppress the voltage elevation on continuous driving, and improve adhesion [0211] without forming additional layers.

Shirota et al. teach carbazole compounds of instant general formula (4) as suitable compounds for the hole transport layer (column 4, lines 38-41, compound 3) used in a organic electroluminescent device (abstract). The reference teaches the compound to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the carbazole compound of Shirota et al. with the device of modified Sato et al. One of ordinary skill in the art would reasonably expect the compound of Shirota et al. to be suitable in the hole transport layer of modified Sato et al. given that the compound is taught as suitable for the hole transport layer of a similar electroluminescent device by Shirota et al. (column 4, lines 38-4). One of ordinary skill would be motivated by a desire to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP-2006/24791-A, JP-2005-251529-A, and JP-2003-272860-A each disclose electroluminescent devices with layers containing a metal oxide and an organic compound, but are cumulative to the rejection of record.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL WILSON whose telephone number is (571) 270-3882. The examiner can normally be reached on Monday-Thursday, 7:30-5:00PM EST, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on (571) 272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MHW

/Callie E. Shosho/
Supervisory Patent Examiner, Art Unit 1794